Claims

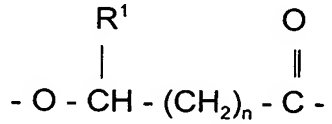
1. A multi-layer film obtainable by coextrusion, comprised of, respectively, at least one

   a) starch blend layer comprised of a modified thermoplastic starch blend, containing more than 1 % to 10 % water, and

   b) polyester layer comprised of a biodegradable polyester,

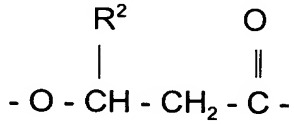
   wherein the starch blend layer contains no polyhydroxyalkanoate copolymer consisting of at least two randomly repeating monomer units,

   wherein a first monomer has the structure (I):



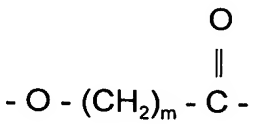
(I)

   wherein R1 is H or a C1 or C2 alkyl group, with n = 1 or 2;
   wherein a second monomer has the structure (II):



(II)

   wherein R2 is a C3 to C19 alkyl or C3 to C19 alkenyl group,
   or the second monomer has the structure (III)



(III)

   wherein m is from 2 to 9.

2. The multi-layer film according to claim 1, characterized in that the starch blend layer is surrounded by two polyester layers.

3. The multi-layer film according to claim 1 or 2, characterized in that the modified

thermoplastic starch blend is comprised of the following components:

- 30 % to 75 % starch,
- 2 % to 10 % water,
- 10 % to 50 % biodegradable polyester,
- 5 % to 20 % compatibilizer,
- up to 10 % plasticizer, and
- up to 3 % processing agent.

4. The multi-layer film according to claim 1 to 3, characterized in that the biodegradable polyester is comprised of dihydroxy compounds and dicarboxylic acids as monomers.

5. The multi-layer film according to claim 4, characterized in that the monomers are butanediol, adipic acid, and terephthalic acid; or butanediol, succinic acid, and adipic acid.

6. The multi-layer film according to one of the claims 1 to 3, characterized in that the polyester layer comprises a polylactide; or a blend of a polylactide and another polyester; or a polyvinyl acetate.

7. The multi-layer film according to claim 3, characterized in that the compatibilizer comprises a polymer component having hydrophilic and hydrophobic groups arranged in blocks, respectively.

8. The multi-layer film according to claim 7, characterized in that the compatibilizer comprises a hydrolyzed polyvinyl acetate that is saponified in blocks.

9. The multi-layer film according to claim 3, characterized in that the plasticizer is glycerine.

10. The multi-layer film according to one of the claims 1 to 9, characterized in that the total thickness of the film is in a range of between 10 µm to 300 µm.

11. The multi-layer film according to one of the claims 1 to 10, characterized in that the thickness of a polyester layer is between 1 µm to 100 µm.

12. The multi-layer film according to one of the claims 1 to 11, characterized in that the thickness of a starch blend layer is between 5 µm to 250 µm.

13. The multi-layer film according to one of the claims 1 to 12, characterized in that a starch blend layer is two times to 10 times thicker than a polyester layer.

14. A method for manufacturing by coextrusion, preferably by blow extrusion, a multi-layer film according to claim 1, wherein, respectively, at least one a) layer of a modified thermoplastic starch blend and b) layer comprised of a biodegradable polyester is built up, wherein the materials of the starch blend layer and of the polyester layer have comparable melting and viscosity properties and wherein the starch blend layer contains more than 1 % to 10 % water.

15. The method according to claim 14, characterized in that the materials of the inner layer and of the outer layer have a viscosity of an MFI value between 4 g to 10 g per 10 minutes at 130 °C and 10 kg load or of an MFI value between 5 g to 40 g per 10 minutes at 160 °C and 10 kg load.

16. The method according to claim 14 or 15, characterized in that the temperature of the starch blend is kept between 90 °C to 140°C.

17. The method according to one of the claims 14 to 16, characterized in that the temperature of the polyester is kept between 110 °C to 150 °C or, when using polylactides for the polyester layer, is kept between 150 °C and 190 °C.

18. The method according to one of the claims 14 to 17, characterized by a blow ratio of 1:2 to 1:5 and removal speeds of 8 m to 30 m per minute.

19. The method according to one of the claim 14 to 18, characterized in that the film

is stretched after extrusion.

20. The method according to claim 19, characterized in that the film is stretched at a temperature between 40 °C and 80 °C.

21. The method according to claim 19 or 20, characterized in that the film is stretched at a ratio of up to 1:5.

22. Use of a multi-layer film according to one of the claims 1 to 13 as a packaging material.

23. Use of a multi-layer film according to one of the claims 1 to 13 as a packaging material for food.